WHO Prequalification of Diagnostics Programme
PUBLIC REPORT

Product: Rapid Test for Antibody to Human Immunodeficiency Virus (HIV) (Colloidal Gold Device)
Number: PQDx 0005-005-00

Abstract

Rapid Test for Antibody to Human Immunodeficiency Virus (HIV) (Colloidal Gold Device)\(^1\) with product codes WJ-1810, WJ-1810E, WJ-1850, WJ-1850E, manufactured by Beijing Wantai Biological Pharmacy Enterprise Co., Ltd, rest of world regulatory version, was accepted for the WHO list of prequalified in vitro diagnostics and was listed on 15 February 2016.

Intended use:
Rapid Test for Antibody to Human Immunodeficiency Virus (HIV) (Colloidal Gold Device) is a single use, rapid device for qualitative detection of antibodies to Human Immunodeficiency Viruses (HIV) in whole blood, serum and plasma specimens. Rapid Test for Antibody to Human Immunodeficiency Virus (HIV) (Colloidal Gold Device) is for use in health facilities by trained staff as an aid for the diagnosis of clinical conditions related to infection with HIV-1 and/or HIV-2 - the etiological agents of the acquired immunodeficiency syndrome (AIDS).

Assay description:
Rapid Test for Antibody to Human Immunodeficiency Virus (HIV) (Colloidal Gold Device) employs chromatographic lateral flow device in a cassette format. Colloidal gold conjugated recombinant antigens corresponding to HIV-1 (gp120, gp41) and HIV-2 (gp-36) are dry-immobilized at the end of nitrocellulose membrane strip. HIV 1+2 antigens are bond at the Test Zone (T) and antibodies are bond at the Control Zone (C). When the sample is added, it migrates by capillary diffusion rehydrating the gold conjugate. If present in sample, HIV 1/2 antibodies will bind with the gold conjugated antigens forming particles. These particles will continue to migrate along the strip until the Test Zone (T) zone where they are captured by the HIV 1+2 antigens generating a visible red line. If there are no HIV 1 or 2 antibodies in sample, no red line is formed in the Test Zone (T). The gold conjugate will continue to migrate alone until it is captured in the Control Zone (C) by the antibodies aggregating in a red line, which indicates the validity of the test.

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\(^1\) The product was originally submitted under the name Anti-human Immunodeficiency virus (HIV) antibody diagnostic kit (colloidal gold). It was later renamed as Rapid Test for Antibody to Human Immunodeficiency Virus (HIV) (Colloidal Gold Device).
For reactive results, line intensity cannot be used to evaluate the anti-HIV antibody levels. A test giving an invalid result should be repeated. Rapid Test for Antibody to Human Immunodeficiency Virus (HIV) (Colloidal Gold Device) does not differentiate between recognition of HIV-1 antibodies and HIV-2 antibodies. Any reactive specimen should be confirmed by another methodology.

**Test kit contents:**

<table>
<thead>
<tr>
<th></th>
<th>10 tests (product code WJ-1810E)</th>
<th>10 tests (product code WJ-1810)</th>
<th>50 tests (product code WJ-1850E)</th>
<th>50 tests (product code WJ-1850)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test cassettes, individually packed in foil pouch</td>
<td>10</td>
<td>10</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Instructions for use</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Diluent buffer</td>
<td>1x 3ml bottle</td>
<td>1x 3ml bottle</td>
<td>3x 3ml bottles</td>
<td>3x 3ml bottles</td>
</tr>
<tr>
<td>Safety Lancet, Single-use disposable safety lancets</td>
<td>10</td>
<td>N/A</td>
<td>50</td>
<td>N/A</td>
</tr>
<tr>
<td>Disposable Pipette, plastic, intended to deliver 40 -50µl per drop</td>
<td>10</td>
<td>N/A</td>
<td>50</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Storage:**
The test kit should be stored at 2°C to 30 °C.

**Shelf-life:**
18 months
Summary of prequalification status for Rapid Test for Antibody to Human Immunodeficiency Virus (HIV) (Colloidal Gold Device)

<table>
<thead>
<tr>
<th>Initial acceptance</th>
<th>Date</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status on PQ list</td>
<td>15 February 2016</td>
<td>listed</td>
</tr>
<tr>
<td>Dossier assessment</td>
<td>28 August 2015</td>
<td>MR</td>
</tr>
<tr>
<td>Inspection status</td>
<td>24 April 2015</td>
<td>MR</td>
</tr>
<tr>
<td>Laboratory evaluation</td>
<td>6 January 2014</td>
<td>MR</td>
</tr>
</tbody>
</table>

MR: Meets Requirements  
N/A: Not Applicable

Rapid Test for Antibody to Human Immunodeficiency Virus (HIV) (Colloidal Gold Device) was accepted for the WHO list of prequalified in vitro diagnostics on the basis of data submitted and publicly available information.

Background information

Beijing Wantai Biological Pharmacy Enterprise Co., Ltd submitted an application for prequalification of Rapid Test for Antibody to Human Immunodeficiency Virus (HIV) (Colloidal Gold Device). Based on the established prioritization criteria, Rapid Test for Antibody to Human Immunodeficiency Virus (HIV) (Colloidal Gold Device) was given priority for prequalification.

Product dossier assessment

Beijing Wantai Biological Pharmacy Enterprise Co., Ltd submitted a product dossier for Rapid Test for Antibody to Human Immunodeficiency Virus (HIV) (Colloidal Gold Device) as per the “Instructions for compilation of a product dossier” (PQDx_018 v1). The information submitted in the product dossier was reviewed by WHO staff and external experts (assessors) appointed by WHO in accordance with the internal report on the screening and assessment of a product dossier (PQDx_009 v2). Based on the product dossier screening and assessment findings, a recommendation was made to accept the product dossier for Anti-human immunodeficiency virus (HIV) antibody diagnostic kit (colloidal gold) for prequalification.

Commitments for prequalification:

1. Perform in-house testing on performance panels (including HIV-O specimens). Final reports of any studies performed will be reviewed at the next re-inspection.
Manufacturing site inspection

A comprehensive inspection was performed at the site of manufacture (No. 31 Life Science Park Road, Changping District, 102206, Beijing, China) of Rapid Test for Antibody to Human Immunodeficiency Virus (HIV) (Colloidal Gold Device) in December 2014 as per the “Information for manufacturers on prequalification inspection procedures for the sites of manufacture of diagnostics” (PQDx_014 v1). The inspection found that the manufacturer had an acceptable quality management system and good manufacturing practices in place that ensured the consistent manufacture of a product of good quality. The manufacturer's responses to the nonconformities to the quality management system found at the time of the inspection were accepted 24 April 2015.

Commitments for prequalification: N/A

Laboratory evaluation

Anti-human Immunodeficiency virus (HIV) antibody diagnostic kit (colloidal gold)\(^2\) (Beijing Wantai Biological Pharmacy Enterprise Co., Ltd.) was evaluated by WHO in the third quarter of 2012 using serum/plasma specimens. From this evaluation, we drew the following conclusions:

Anti-human Immunodeficiency virus (HIV) antibody diagnostic kit (colloidal gold) is an immunochromatographic assay for the detection of HIV-1/2 antibodies in human whole blood, serum and plasma specimens. A volume of 80 μL of specimen is needed to perform the assay. This type of assay requires no sophisticated equipment and can therefore be performed in laboratories with limited facilities and non-laboratory settings. Reading of the results can be done visually i.e. subjectively read.

In this limited evaluation on a panel of 1079 clinically-derived specimens, we found an initial sensitivity (95% CI) of 99.76% (98.7% - 100%) and an initial specificity (95% CI) of 98.33% (97.0% - 99.2%) compared to the reference assays. The final sensitivity (95% CI) was 100% (99.1% - 100%) and the final specificity (95% CI) was 98.48% (97.2% - 99.3%) compared to the reference assays. Lot to lot variation was acceptable with the exception of one dilution series for which there was a 2-fold difference between lots.

For eight seroconversion panels, Anti-human Immunodeficiency virus (HIV) antibody diagnostic kit (colloidal gold) detected on average 0.5 specimens later than the benchmark assay; Enzygnost Anti-HIV 1/2 Plus (Siemens Healthcare Diagnostics).

For the mixed titer panel, Anti-human Immunodeficiency virus (HIV) antibody diagnostic kit (colloidal gold) correctly classified all specimens.

\(^2\) The product was later renamed Rapid Test for Antibody to Human Immunodeficiency Virus (HIV) (Colloidal Gold Device)
For the 1st International Reference Panel for anti-HIV [NIBSC code 02/210], Anti-human Immunodeficiency virus (HIV) antibody diagnostic kit (colloidal gold) correctly classified all specimens.

In this study, 0% of the results were recorded as indeterminate. Results were interpreted independently by three technicians; the inter-reader variability was 0.09%. The invalid rate was 0.09%.
Labelling

1. Labels
2. Instructions for use
1. Labels

Shipping box label

Kit box label for WJ-1810, WJ-1810E
Kit box label for WJ-1850, WJ-1850E

Rapid Test for Antibody to Human Immunodeficiency Virus (HIV) (Colloidal Gold Device)
Immunochromatographic test for qualitative detection of antibodies against HIV 1+2 in human serum, plasma and whole blood samples.

<table>
<thead>
<tr>
<th>REF</th>
<th>WJ-1850</th>
<th>WJ-1850E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Cassette</td>
<td>x 50</td>
<td>x 50</td>
</tr>
<tr>
<td>Diluent Buffer</td>
<td>x 3</td>
<td>x 3</td>
</tr>
<tr>
<td>Safety Lancet</td>
<td>x 50</td>
<td></td>
</tr>
<tr>
<td>Pipette</td>
<td>x 50</td>
<td></td>
</tr>
</tbody>
</table>

Box label for WJ-1810, WJ-1810E

Box label for WJ-1850, WJ-1850E
Pouch label for WJ-1810, WJ-1810E, WJ-1850, WJ-1850E
PRINCIPLE OF THE ASSAY

Wantai Rapid Test for Antibody to Human Immunodeficiency Virus (HIV) (Colloidal Gold Device) employs chromatographic lateral flow device in a cassette format. Colloidal gold conjugated recombinant antigens corresponding to HIV-1 (gp120, gp41) and HIV-2 (gp-36) are dry-immobilized at the end of nitrocellulose membrane strip. HIV 1+2 antigens are bound at the Test Zone (T) and antibodies are bound at the Control Zone (C). When the specimen is added, it migrates by capillary diffusion rehydrating the gold conjugate. The gold conjugate in specimen, HIV 1/2 antibodies will bind with the gold conjugated antigens forming particles. These particles will continue to migrate along the strip until the Test Zone (T) zone where they are captured by the HIV 1+2 antigens generating a visible red line. If there are no HIV 1 or 2 antibodies in specimen, no red line is formed in the Test Zone (T). The gold conjugate will continue to migrate alone until it is captured in the Control Zone(C) by the antibodies aggregating in a red line, which indicates the validity of the test.

SPECIMEN COLLECTION

Whole Blood specimen: Ask the person to clean hands. Choose a puncture site on his or her fingertip. Clean the fingertip with Alcohol Prep Pad. Place the Safety Lancet on a selected puncture site. Forcefully press the tip of the Safety Lancet against the fingertip. Wipe away the first drop of blood with sterile gauze or cotton. Using the disposable specimen transfer device provided within the test kit; collect blood from the puncture site. Alternatively, draw blood following laboratory procedure for obtaining venous blood. Do not test whole blood specimens if older than 3 days.

Serum / Plasma specimens: Fresh serum or plasma specimen can be used. No special patient preparation required.

- Plasma: Collect whole blood into a collection tube (containing EDTA, citrate or heparin) by venipuncture. Separate the plasma by centrifugation.
- Serum: Collect whole blood into a collection tube (containing no anticoagulants) by venipuncture. Allow the blood to clot. Separate by centrifugation.

Any visible particulate matter in the specimen should be removed by centrifugation or filtration. Avoid the use of hemolytic, turbid, microorganism contaminated specimens or specimens stored for over 30 days at 2-8°C. Store specimen at 2-8°C. Specimens not required for assay within 3 days should be stored frozen (-20°C or lower). Avoid specimen deterioration by multiple freeze-thaw cycles.

STORAGE AND STABILITY

The Rapid Test for Antibody to Human Immunodeficiency Virus (HIV) (Colloidal Gold Device) can be stored at room temperature (2-30°C, do not freeze) for 18 months from the date of manufacture.

PRECAUTIONS AND SAFETY

Rapid Test for Antibody to Human Immunodeficiency Virus (HIV) (Colloidal Gold Device) is for In Vitro Use Only

FOR PROFESSIONAL USE ONLY

1. All the waste and specimen should be treated in case of transmitting disease and must be properly disinfected (autoclaving is preferred) before disposal.
2. Once you have taken the cassette out of the pouch, carry out your testing as early as possible (no more than 20 minutes) to avoid cassette becoming moist. The nitrocellulose membrane can absorb water, which can affect the test chromatography performance.
3. Make sure that the test is not expired (check the expiry date on the kit box).
4. If micro pipettor is used, calibrate it frequently to assure the accuracy of dispensing. Use different disposal pipette tips for each specimen in order to avoid cross-contaminations.
5. Do not modify the test procedure.
6. Do not reuse the test cassettes, lancets and pipettes. Autoclave before disposal.
7. A test giving an invalid result should be repeated.
8. Always add accurate volume of specimen.
9. Blood that has been chemically treated, heated, diluted, or otherwise modified may give inaccurate results.
10. If the procedure is migrating too slowly on the test strip, add one drop of diluent buffer to the cassette after adding of the specimen.
11. Always interpret the results under good light conditions to avoid misreading of the test results.
12. Seek immediate medical attention in case of injuries due to improper handling of the kit components including the test cassette and the lancet.
13. Use micro pipettor, or the supplied disposable pipettes for transfer of specimens onto the test cassette. If disposable pipettes are not provided, use pipettes from alternative suppliers which are capable of delivering of volume of 40μl -50μl per drop.

ASSAY PROCEDURE
Place the cassette on flat surface. Before opening, allow the test cassette to reach room temperature. Use it immediately (within 20 minutes) after opening.

If specimen stored at 2-8°C or at -20°C are to be tested, such specimen should be completely thawed and equilibrated at room temperature first. All specimens and cassettes should be properly labeled and identified to avoid mixing up of testing results.

1. For whole blood specimens: Open the pouch and add 50μl (or one drop using the provided pipette) of whole blood into the specimen window (S). Immediately add one drop diluent buffer into the specimen window.
2. For serum / plasma specimens: Open the pouch and add 80μl (or two drops using the provided pipette) of serum or plasma into the specimen window (S). Avoid dropping specimen or buffer in the observation window. Do not allow the specimen to overflow.
3. Read the results from 10 minutes after specimen and buffer loading, to maximum of 30 minutes. Do not read the results after 30 minutes.

RESULTS
Quality Control: One red line will always appear next to the Control Zone (C) indicating the validity of the test. Invalid Test run: If no red line appears, the test is invalid - discard the test and repeat with new specimen and new cassette.

Reactive Results: One red line appears within 10 to 30 minutes next to the Test Zone (T) which indicates that antibodies to HIV 1+2 have been detected using this test.

Non-reactive Results: No red line appears within 30 minutes next to the Test Zone (T) which indicates that no antibodies to HIV 1+2 have been detected with this test. However, this does not exclude the possibility from infection with HIV.

The reactive result obtained with Rapid Test for Antibody to Human Immunodeficiency Virus (HIV) (Colloidal Gold Device) at cannot be the final diagnosis of HIV. Any reactive result must be interpreted in conjunction with the patient clinical history and another laboratory testing results. Follow-up and supplementary testing of all reactive specimen with other tests is required to confirm any reactive result.

LIMITATIONS
1. Non-reactive results do not exclude the possibility of HIV exposure or infection. Infection through recent exposure (seroconversion) to HIV, or late AIDS may not be detectable. For reactive results, line intensity cannot be used to evaluate the anti-HIV antibody levels. A test giving an invalid result should be repeated. Rapid Test for Antibody to Human Immunodeficiency Virus (HIV) (Colloidal Gold Device) does not differentiate between recognition of HIV-1 antibodies and HIV-2 antibodies.
2. Antiretroviral therapy (ART) may suppress HIV replication to undetectable levels.
3. Anti-HIV antibodies may not be detectable if HIV infection occurs in infancy or early childhood.

PERFORMANCE DATA
1. In a clinical evaluation of the performance of Rapid Test for Antibody to Human Immunodeficiency Virus (HIV) (Colloidal Gold Device) conducted in China between 2002 and 2003, using 2657 confirmed negative and 667 positive specimens, sensitivity was 99.40% (666/667) and specificity was 100% (2657/2657).
2. Additional studies both conducted in 2012, in Thailand, and in Belgium, demonstrated sensitivity of 100% (200/200), and specificity of 99.20% (992/1000) of the test in the Thailand study, and sensitivity of 100% (424/424) and specificity of 98.48% (648/658) in the Belgium study.
4. Results from HIV seroconversion panels: The mean seroconversion index on 8 different seroconversion panels which have been tested was 0.5 specimens compared to the benchmark assay Enzygnost Anti-HIV 1/2 Plus EIA. The test detected HIV-1/2 antibodies on average, 0.5 specimens later than the benchmark assay. The seroconversion performance of Wantai’s test was also compared against another, well-established on the market rapid test for detection of antibodies against HIV-1/2.

BIBLIOGRAPHY
5. Ecker B et al.,Overexpression and purification of a recombinant chimeric type HIV type 1 envelope peptide and application in an sandwich indirect enzyme linked immunosorbent assay (II-ELISA) for detection of antibodies to HIV-1/2 in blood. HIV Virology, 1989, 17: 14-26.

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